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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICANT: GILES BUDGE )  
SERIAL NO: 10/657,833 )  
FILED: 9 SEPT 2003 )  
FOR: CARTON AND LINER ASSEMBLY )  
AND METHOD OF MANUFACTURE )  
THEREOF )  
ART UNIT: UNKNOWN )  
EXAMINER: UNKNOWN )

**TRANSMITTAL OF PRIORITY DOCUMENTS**

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Dear Sir:

Enclosed herewith is a certified copy of British Application No. 0305384.0 filed 08 March 2003 and a certified copy of British Application No. 0220802.3 filed 9 September 2002 for which the above-identified patent application claims priority.

If, for any reason, this priority document is not acceptable, please inform the undersigned as soon as possible.

Respectfully Submitted  
HEAD, JOHNSON & KACHIGIAN

Date: 25 September 2003

  
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INVESTOR IN PEOPLE

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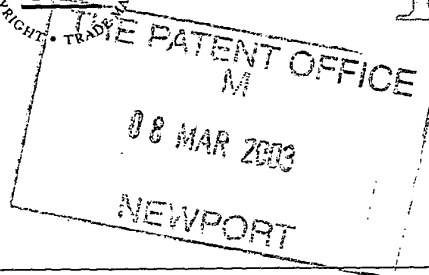


# Patents Form 1/77

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(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference	AT-9167-GB		
2. Patent application number (The Patent Office will fill in this part)	0305384.0		08 MAR 2003
3. Full name, address and postcode of the or of each applicant (underline all surnames)	Polestar Jowetts Limited Evanston Avenue off Kirkstall Road Leeds LS4 2HR 7821812001 England		
Patents ADP number (if you know it)  If the applicant is a corporate body, give the country/state of its incorporation			
4. Title of the invention	Carton and Liner Assembly and Method of Manufacture thereof		
5. Name of your agent (if you have one)	Bailey Walsh & Co		
"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	5 York Place Leeds LS1 2SD		
Patents ADP number (if you know it)	224001 ✓		
6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day / month / year)
7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing (day / month / year)	
8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:			
a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	Yes		

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Description

17 ✓

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Priority documents

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Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents  
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11. I/We request the grant of a patent on the basis of this application.

Signature



Date

07.03.2003

12. Name and daytime telephone number of person to contact in the United Kingdom

A Tomkinson  
0113 243 3824

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**Carton and Liner Assembly, and Method of Manufacture thereof**

This invention relates to a carton and liner assembly, and a method of manufacture thereof, and more specifically to a carton manufacturing method for producing cartons which are ideally adapted to contain a rigid or semi rigid plastics material liner component which is to be secured within the carton. Yet more specifically, this invention is exclusively concerned with open topped or lidless cartons having an erected shape which lends itself to nesting of a plurality of cartons, one within the other.

Although the following description makes almost exclusive reference to ready meal type trays and cartons such as those which commonly contain perishable pre-cooked foods such as curries and common Chinese dishes, it will be appreciated by those skilled in the art of carton manufacture and those commonly using such cartons that the invention has wider application. Indeed the ultimate contents of the carton are irrelevant, other than that they can be hot or heated, or are intended at some stage to become hot when within the tray which is likely to require some degree of manual handling subsequently.

There are currently a proliferation of cartons in use for the containment of food products, for example substances sold at delicatessens, and in cases where there is no requirement for subsequent heating of the foodstuff, a simple uncoated carton board carton may suffice. In general, carton board is hygroscopic and will deteriorate the longer a moist food product is contained in a carton manufactured in such a material. In an effort to reduce this deterioration, carton manufacturers often use a polyethylene or polyethylene terephthalate (PET) coated board as this prevents the penetration of moisture into the structure of the board.

Alternatively, it is possible to provide a carton with a semi rigid plastics liner which can be inserted into an empty erected open topped or lidless carton immediately prior to or subsequent to filling with foodstuffs and the like. In this assembly, the liner prevents any contact between the foodstuff and the carton and depending on the shape and profile of the liner, a certain amount of insulation of the foodstuff can be achieved. For instance, where a hot food product is disposed within the liner, a user can hold the assembly on the outer walls of the carton without any significant heat transfer between the liner and the carton walls. Likewise, a cold food product can be placed within the liner and little or no heat transfer from the outer surfaces of the carton held by the user and the food product will occur. This is achieved by means of an air gap defined between the inner liner and the side walls of the outer carton.

Currently practically all commercially available cartons are erected from a flat blank of carton board or deformed into a desired carton shape using a punch and die. In the majority of circumstances the use of plastics material rigid or semi rigid liners has not been widely accepted because of difficulty in automating the process of inserting a liner into an erected or punch-formed carton and thereafter ensuring that the liner is retained in the carton.

Many earlier patents and applications exist describing carton and container assemblies which comprise an inner and an outer component, the walls of which may be separated from one another to provide an insulating effect for a hot or cold foodstuff disposed within the cavity defined by the walls of the inner container. In this regard, WO0021849 to Clarke describes a thermally insulated microwave cooking container having an inner thermoformed vessel and an outer thermoformed vessel, each of which having side walls



which define cavities, the walls of one vessel being provided with ribs which project towards the walls of the other vessel to maintain separation therebetween. In this manner, the walls of the outer vessel can be maintained relatively cool or warm compared to the walls of the inner vessel which surround a hot or cold food product.

This application also mentions that the outer vessel may be formed of different materials and that the bases of the inner and out vessels may be bonded to one another by means of an adhesive to ensure that the two vessel, or at least their bases, are not easily separated from one another.

GB2194515 in the name of Waddingtons Cartons Limited describes an assembly consisting of a plastics material inner liner of rectangular cross-section disposed inside a board material carton of similarly rectangular cross-section. The assembly can subsequently be sealed by means of a lid applied to a peripheral lip provided around the upper edges of the carton and on which a corresponding lip of the liner is seated.

It will be seen from the above published documents that the concept of providing plastics material liners to contain food, and the concept of inserting such liners in outer supporting cartons, whether of plastic or board is well known. It is also to be mentioned that the concept of nesting cartons and liners separately to form a slug of cartons or liners is also well known.

Traditionally, in the manufacture of carton assemblies consisting of an outer carton and an inner liner, the insertion of the inner liner within the outer carton is effected immediately prior to or subsequent to the deposition of food within the liner whether this be in industrial food packaging premises or at fast food premises, and more often than not, manually. The fundamental difficulty with

manufacturing outer cartons in plastics material is their cost, and the disadvantage with carton assemblies comprising inner and outer components having formations on their edges is the time taken to ensure proper engagement of these formations. The reader will appreciate the need for ensuring the secure connection of the inner component of these type of assemblies to the other, particularly as the inner liner component can often contain foodstuffs at temperatures approaching (and possibly even above) 100°C.

Currently, it is conventional for ready meals to be provided in simple thermoformed plastics trays which are then sealed with a suitable plastics film whereafter the sealed tray is then inserted inside a simple cardboard sleeve. The reason for this type of packaging is that it is generally very difficult to print on the outer surfaces of the plastics liners because of the difficulty in passing unusually shaped articles through printing machinery and furthermore on account of the difficulty of applying inks to plastics materials which are necessary non-absorbent. It is of course much simpler to print flat board blanks which are subsequently erected into cartons or sleeves for the containment of said trays. It is generally believed in the carton industry and perceived by consumers in general that the use of commercially printed board enhances the aesthetic qualities of a simple plastics liner, and in many instances this has been one of the prime movers behind the combined use of a carton sleeve or receptacle in combination with a thermoformed plastics liner.

There is currently in production in the UK a particularly relevant carton and liner assembly adapted for containing butter apparently manufactured by Rexam. This carton comprises an initially flat carton blank which is deposited into a mould probably under some force, such action causing the carton walls to be upwardly inclined from the base against the side walls of the mould. The blank and

mould are complementary in shape and are additionally provided with radiused corners and edges. Once the carton is in its erected condition within the mould, a plastics material such as PET or polyethylene is injection or blow moulded into the mould to the inside of the carton walls. The plastics material is applied at elevated temperature and is molten so that it adheres to the inner surfaces of the carton walls thus maintaining their desired and erected orientation when the combined assembly of inner liner and outer carton is removed from the mould. Additionally, as parting of the molding process, the plastics material is moulded into a rim which rises above the uppermost edges of the outer carton and provides a means by which a lid can be secured to the assembly.

In the resulting assembly, the walls and base of the inner plastics liner are covered by the outer carton to which they are totally adhered by virtue of the moulding process, and therefore there is no provision for any insulating separation or insulating means between the plastics material of the liner and the board of the carton.

It will be appreciated from the above that although this process provides a means whereby a carton and liner assembly may be formed, it is an expensive and intricate process, and furthermore cannot achieve one of the objects of the present invention which is to provide a carton and liner assembly which at least to some degree insulates the outer surfaces of the carton from the inner surfaces of the plastics liner which in the case of the present invention is adapted to contain hot or cold foodstuffs. In addition, the carton and liner assembly can not be used, or at least is unsuitable for use in ovens and/microwaves.

It is a further object of the invention to provide a carton manufacturing method which allows for subsequent simple and quick means of securing a secondary liner within a carton.

It is a yet further object of the invention to provide a carton assembly consisting of a paper or board material outer carton component and a plastics material inner liner component which are secured to one another and which can be efficiently nested.

According to a first aspect of the present invention there is provided a carton and liner assembly, said assembly comprising an open-topped carton erected from a simple carton blank and a liner which is secured to the carton, said liner being in the form of a tray shaped receptacle having a rim which overlies the uppermost edges of the walls of the carton, both said liner and said carton having side walls and a base and characterised in that the carton is secured to the liner by means of adhesive applied to at least the base of the liner and/or carton.

Preferably the liner is formed from a plastics material, but any other material capable of retaining moist food products and the like therein for an indefinite time without substantial degradation can be used.

Further preferably this plastics material is in the form of a foamed plastics material, such as crystalline PET (CPET). The foamed plastics material provides the carton and liner assembly with the desired insulation properties required if the assembly becomes hot or is heated, thereby allowing manual handling of the assembly without the risk, or at least a reduced risk of the user being injured or burnt. Use of CPET allows the carton and liner assembly to be used in oven and microwave cooking applications.

Preferably the base of the liner is substantially planar to allow mutual cooperation with the substantially planar base of the carton.

In one embodiment both the liner and the carton are provided with radiused corners where their respective side walls meet and where the edges which define their bases meet, thereby allowing efficient nesting of the assembly after manufacture. The term radiused can also cover any suitable arcuate or curved shape.

The liner can be provided with substantially planar side walls or, alternatively, the liner can be provided with one or more rib members thereon.

Preferably the adhesive used to secure the carton and the liner together is food safe and can operate over a temperature range of -40 to +220 degrees Centigrade.

According to a further aspect of the present invention there is provided a method of manufacturing a carton and liner assembly as described above wherein the method includes the steps of depositing wet adhesive on the base of the carton and/or a liner and subsequently depositing the liner in the interior cavity of the carton, together with the application of some pressure onto the liner base, thereby securing the carton to the liner.

In one embodiment the liner is deposited in the cavity of the carton whilst the adhesive is still wet. The carton can be erected, assembled and adhered to the liner at a first location or the carton can be erected at a first location and delivered to a second remote location separately to the liner for subsequent assembly and adherence with the liner. In the latter case, the cartons and liners are typically nested separately prior to assembly.

In this embodiment the adhesive may be applied to the base and/or side wall of the carton and/or liner.

Preferably once assembled, the carton and liner are then moved or lifted from the point of assembly and deposited in a nest. The wet adhesive is sufficiently adhesive prior to drying to ensure that the carton is lifted together with the liner, whereafter the adhesive dries to form a secure bond between the respective bases and/or side walls of the liner and carton.

In an alternative embodiment the liner is deposited inside the carton after the adhesive has dried. In this embodiment the adhesive has self adhesive properties when in a dried condition (i.e., maintains its adhesive qualities for a predetermined period of time after application). The cartons are shaped so as to provide a predetermined space between a first carton base and the base of a further carton nested therein, thereby allowing adhesive applied to a base of the first carton to dry without adhering to the underside base surface of a nested carton. In this embodiment, a stack of nested cartons can have adhesive applied thereto and can be delivered to an assembly location for assembly with corresponding liners without the requirement for adhesive to be supplied at the assembly location.

In providing a separate inner liner for location in an outer carton in accordance with the present invention, the liner can be inserted into the carton and the two components can be adhered together in a region of their mutually contacting bases in a single motion. This greatly increases the speed of the assembly process and therefore reduces the cost of the same.

In one embodiment, one or more flaps are provided on the carton to act as a shelf or ledge to limit the movement of a further carton as it is received in the carton in a nesting assembly. The flaps can be provided on the internal or external surfaces of the carton to protrude inwardly or outwardly respectively as required.

Preferably a substantial portion of the walls of adjacent nested cartons are in contact with one another and the bases of the cartons are separated by a distance greater than the thickness of adhesive applied to the lower carton base.

In an alternative embodiment the carton is constructed by adhering side wall panels thereof to flaps provided on adjacent side walls and which are disposed internally of the carton. Each of the flaps is deformed by a debossing, embossing or similar step such that on erection, protrusions or ledges are defined internally of the erected carton structure to prevent the base of a carton received within the cavity of another carton from coming into contact with the base thereof.

Preferably the carton is erected into a tray-shape from the simple blank as a separate step in the method process. The carton can be formed in a required shape and the liner is typically complementary in shape thereto.

Most preferably the carton is initially flat in the form of a simple blank and subsequently erected into its carton shape using a punch and die, respective side walls being adhered to one another on the inside of one or both pairs of the side walls by means of extension flaps which extend around the side corners of the carton and underneath the respective adjacent side walls. Other conventional means of forming the carton can also be used, such as the user of flaps on a side wall for location in corresponding apertures on an adjacent side wall.

It is yet further preferable that between the side walls and extension flaps there is provided an arcuately shaped panel, optionally

provided with a series of lines of weakness extending radially away from the inner curved edge to the outer curved edge.

Most preferably, the erection of the carton results in a conventional carton with four upwardly inclined corners, but the subsequent insertion of the liner thereinto constrains these corners to conform to the radiused upwardly inclined corners of the liner, most preferably by virtue of the lines of weakness provided in the arcuately shaped panels.

Most preferably the base panel of the carton blank is provided with radiused corners and corresponds in size to the radiused corners of the liner which is ultimately inserted into the subsequently erected carton.

It will be appreciated from the above that the completed assembly can be provided to customers and users in its completed condition or the liner and carton can be provided to the customer separately prior to completing assembly. The rim of the liner can also be used for the application of any conventional board or plastics lid to effectively seal the liner and its contents from ambient conditions and for transport.

According to a yet further aspect of the present invention there is provided a method of manufacturing an assembly as described above wherein the method includes the steps of depositing a wet adhesive on the base of the carton and depositing a liner inside the tray together with the application of some pressure onto said liner base, following by the step of lifting the liner and depositing same in a nest, the wet adhesive being sufficiently adhesive before drying to ensure that the carton is lifted together with the liner when the assembly is moved to be deposited in said nest whereafter said



adhesive dries to form a secure bond between the respective bases of liner and carton.

Separation of the carton and liner assembly for disposal or otherwise can be undertaken by forcing the two components apart to release the adhesive bond. Further features, such as weak or frangible portions on the carton, pull tabs and/or the like can be provided to increase the ease by which the assembly can be separated.

Embodiments of the present invention will now be described by way of example with reference to the following drawings wherein:

Figure 1 shows a plan view of a simple carton blank for use according to one embodiment of the present invention;

Figure 2 shows a perspective view of the blank of Figure 1 in its erected condition, and a simple tray shaped liner thereabove for deposition within the erected carton;

Figure 3 shows a plan view of a simple carton blank for use according to a further embodiment of the present invention;

Figure 4 shows a perspective view of a carton erected from the blank of figure 3;

Figure 5 shows a perspective view of two cartons according to figure 3 shown in a nested relationship; and

Figure 6 shows a yet further example of a carton according to the present invention.

Referring firstly to Figure 1 there is shown a blank 2 having a base panel 4 and respective side wall panels 6, 8, 10, 12 foldably secured along the edges of the base panel 4. On the extremities of the side wall panels 6, 10 there are provided arcuately shaped panels 6A, 6B, 10A, 10B, foldably connected to said side panels 6, 10, and said arcuately shaped panels terminate in extension flaps 7A, 7B, 11A, 11B respectively.

It is to be noted that the corners of the base panel 4 are radiused as shown at 4A, 4B, 4C, 4D, and during the punch and die style erection of such a carton, if such an erection method is used, side walls 6 and 10 of the carton are progressively upwardly inclined from the base and the arcuately shaped panels, 6A, 6B, 10A, 10B are conformed around the interior surfaces of the die so that the extension panels 7A, 7B, 11A, 11B are disposed to the inside of the side wall panels 8, 12. During the erection process, adhesive is applied either to the side wall panels 8, 12 in the region of their extremities, or to the outer surfaces of the extension panels 7A, 7B, 11A, 11B to enable the carton to retain its erected shape by virtue the adhesion of the extension panels 7A, 7B, 11A, 11B to the inner surfaces of the side wall panels 8, 12 as shown in Figure 2.

In accordance with the invention, after the erection of the carton blank shown in Figure 1 as previously described, a simple open topped carton 20 is provided into which portions of wet adhesive 22, 24 are provided substantially on the base panel 4, but possibly, and not detrimentally, such adhesive may transgress the boundary edges on either side of the base panel 4 such that there may be small amounts of the wet adhesive applied to the side wall panels 6, 10. After the application of the adhesive, a simple tray shaped foamed plastics liner 26 having a base panel 28 and side wall panels 30, 32, 34, 36 may be pressuredly deposited in the open topped carton 20 such that its base panel 28 is adhered to the correspondingly shaped

and sized base panel 4 of the carton. The resulting carton and liner assembly is one which provides at least some degree of insulation between the outer surfaces of the side walls 30, 32, 34, 36 of the liner and the inner surfaces of the side walls 6, 8, 10, 12 of the carton on the one hand because of the insulating properties of the foamed plastic material used for the liner construction, and on the other hand because to a substantial extent, the side walls of the carton 6, 8, 10, 12 are not in anyway adhered to the outer surfaces of the side walls 30, 32, 34, 36 of the inner shaped liner.

Furthermore, it is to be noted that the corners of the base panel 28 of the liner are radiused as indicated at 28A, 28B, 28C, 28D, as are the corners of the liner where the side walls meet, and it is these radiused corners of the liner which constrain the arcuately shaped panels 6A, 6B, 10A, 10B to adopt a similarly radiused configuration, notwithstanding that the punch and die erection process may initially have provided these arcuately shaped panels with generally sharp corners. It is to be noted from Figures 1 and 2 that each of the arcuately shaped panels 6A, 6B, 10A, 10B is provided with a plurality of score or crease lines which provide these arcuately shaped panels with lines of weakness and enable them to adopt the radiused configuration hereinbefore described. These lines of weakness are indicated generally in the figures by reference numeral 30.

Referring to figures 3-5, there is illustrated a further example of a carton erected from a blank that can be used for assembly with a correspondingly shaped liner in accordance with the present invention.

The carton blank 102 shown in figure 3 can be erected to form a conventional bellows style carton as shown in figure 4. The blank has side wall panels 104, 106, 108 and 110 foldingly connected to a

base 112. Intermediate panel pairs 104''-106', 106''-108', 108''-110' and 110''-104' respectively are foldingly connected together and to respective side wall panels 104, 106, 108, 110. The intermediate panel pairs can be folded inwardly or outwardly for adherence or attachment via other conventional attachment means to the corresponding side wall panels.

In one embodiment, during the manufacture of the carton blank 2, a layer of adhesive 114 is applied to the side of the base panel which after erection of the carton forms the internal base of the carton. Alternatively, the adhesive can be applied to the internal base of the carton once the carton has been erected, as shown in figure 4.

The erected carton 120 has an open end 122 and a closed end formed by base 112. A correspondingly shaped liner (not shown) is inserted into the carton via open end 122 in a similar manner to that described above.

The liner can be provided with a flange along an upper peripheral edge (of the type shown by reference numeral 27 in figure 2) which can cooperate with upper peripheral edge 123 of carton 120. The upper peripheral edge 123 of carton 120 can also be provided with a seat or flange (not shown) on which the flange of the liner can locate.

The erected carton 120 is formed such that the dimensions of the base are smaller than the dimensions of the upper peripheral edge thereof. As such, when two cartons are seated together (the base of one carton is located in the open top of a further carton) in a nest 130, as shown in figure 5, a space of pre-determined distance 132 is provided between the base 112 of one carton 120a and the underside surface of base 112' of a further carton 120b. This space allows wet adhesive to be applied to the base 112 of carton 120a

either during or after erection of the carton and dried without adhering to the underside surface of base 112'. This is of particular advantage since it allows cartons to be erected, adhesive applied thereto and nested at a first location and then transported to a further location and/or stored for a pre-determined period of time prior to assembling a liner with each carton.

The bellows type construction of the cartons, wherein bellows formed from the intermediate panel pairs are provided on the outside of the respective pair of opposite side walls, significantly increases the thickness of the side walls, thereby also limiting the extent to which one carton can be nested in another to ensure a space is left between the bases of the cartons.

In a further alternative means, one or more flaps can be provided on the carton which protrude inwardly of the carton interior at a required location. The flaps act to limit movement of a further carton being nested therein. The flaps can be formed from appropriately formed cuts made in the carton blank. Flaps can also be provided which protrude outwardly of the carton and which cooperate with the interior surface of a further carton into which it is located, thereby limiting movement thereof.

The adhesive can be applied to the side walls of the carton in addition to the base. However, an advantage of applying adhesive to the base of the carton is that, if a punch and die is used to form the blank, the adhesive can be pre-applied substantially in the centre of the blank prior to it being fed into the punching apparatus. The punch can be provided with a cavity in its central region so that it performs the punching operation on the majority of the blank without any contact between the punch and the adhesively coated area(s) of the blank. In addition, it allows nesting of the carton without adherence of adjacent nested cartons with one another.

The layer of adhesive can be indiscriminately applied but it can also be applied in a pre-determined pattern. Indeed, this is desirable where the area in contact with the liner base is typically of a particular shape, such as circular.

The adhesive is typically of a type which does not cure or set immediately after application and which retains its adhesive qualities for a period of at least 6-8 weeks. The adhesive is also of a type which can be used without representing a safety hazard to food which is subsequently located in the carton/liner assembly.

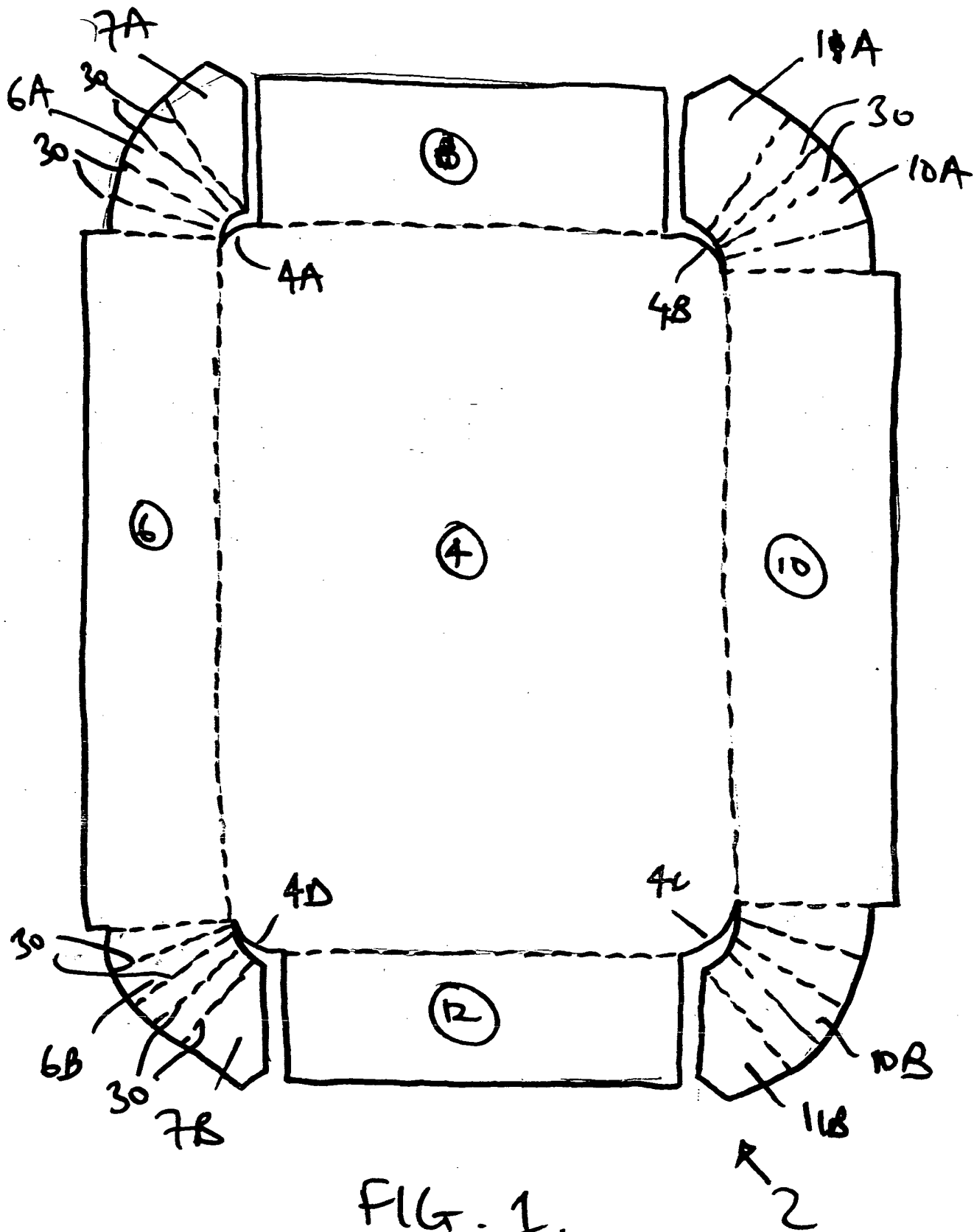
A further example of a carton 200 for use with the present invention is shown in figure 6. The carton 200 comprises a base 202 from which four side wall panels 204, 206, 208 and 210 extend in an upwardly direction. The side wall panels are held in position by means of adhesion flaps 204A, 204B, 208A, 208B which are adhered to the inside of panels 206, 210.

A plurality of lines of weakness 212 are provided in the blank which are creased, folded or otherwise and are in addition to the fold lines of the blank between the adhesion flaps and the side wall panels. The reason for the provision of these lines of weakness is to allow the corners of the carton to relax slightly as a liner (not shown), which is typically curved around its corners is inserted into the carton, the corners becoming curved or radiused in the process. In this manner the corners of the carton may conform to the curved corners of the liner to achieve a snug fit.

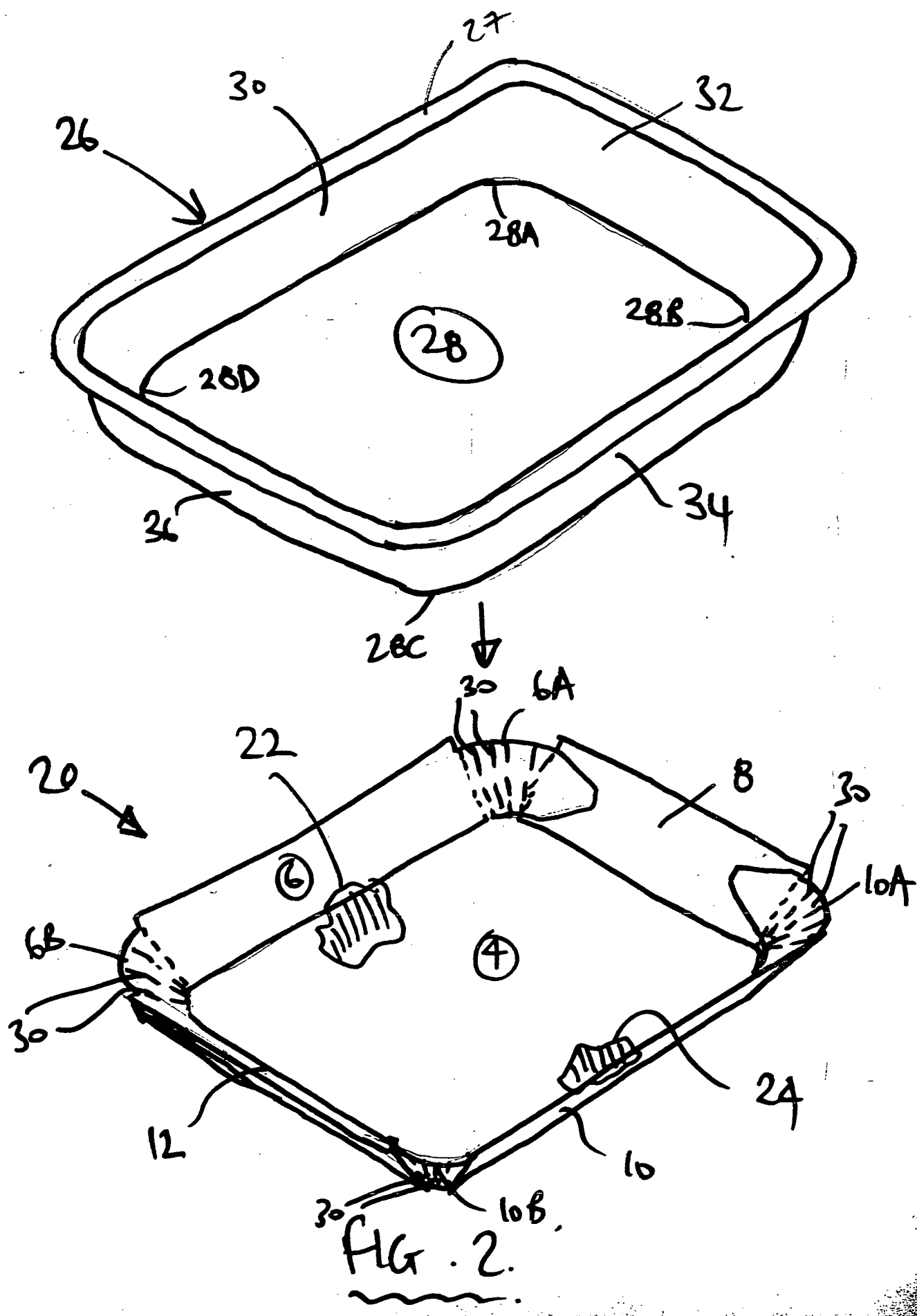
Adhesive can be applied to base 202 of the carton to secure the liner thereto in the normal manner.

A further feature of the carton shown in figure 6 is the raised lips 204C, 206C, 208C and 210C which are provided on the upper edge of the side wall panels. The lips restrict the downward movement of a liner into the carton as they abut underneath a flange provided on the upper peripheral edge of the liner. The raised lips terminate in the regions of the corners to form a plurality of notches to allow for the slightly enlarged moulding features which are prevalent in the liner at the corners proximate the flange. The notches also prevent denesting of the cartons when stacked.

The invention of the present invention is particularly, although not necessarily exclusively suitable for use in ovens and microwaves.







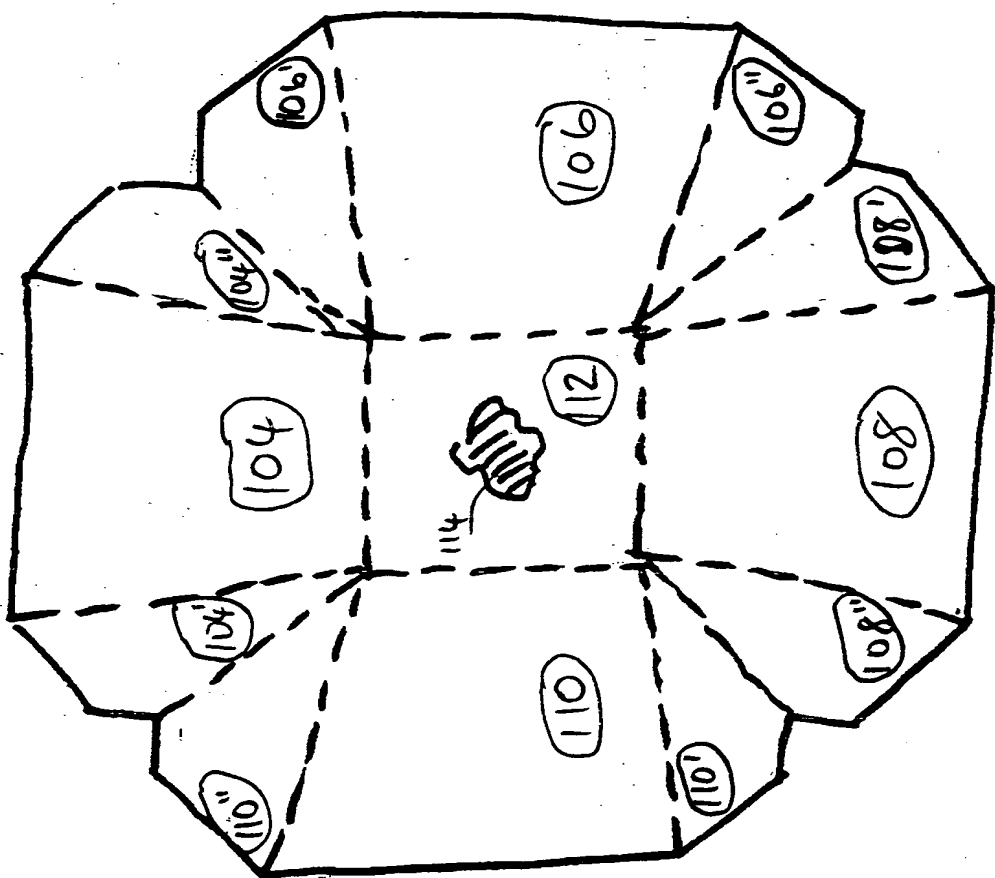


FIG. 3.

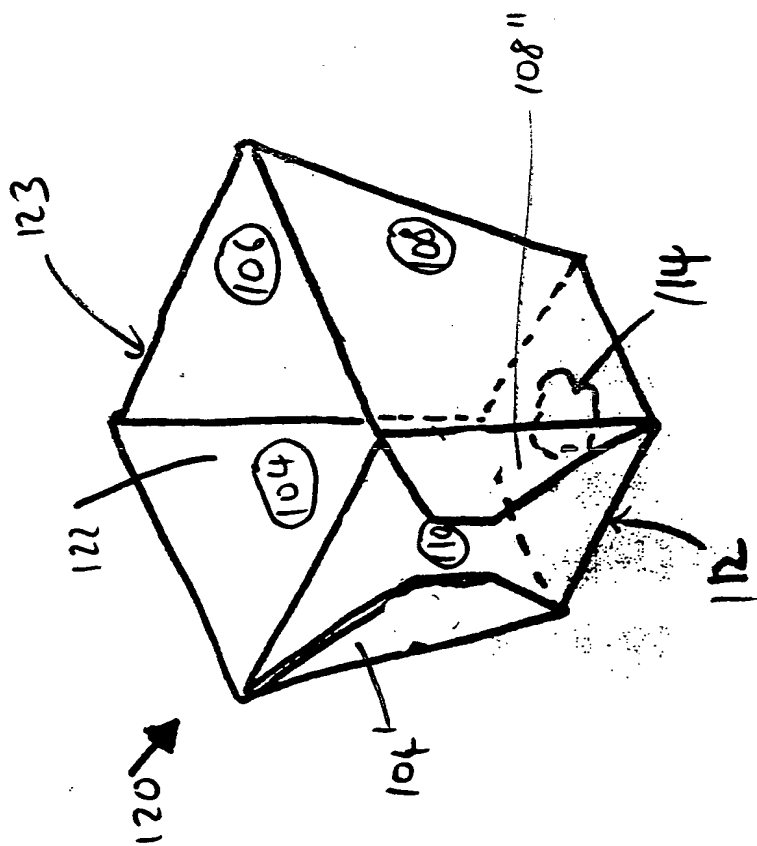


Fig 4

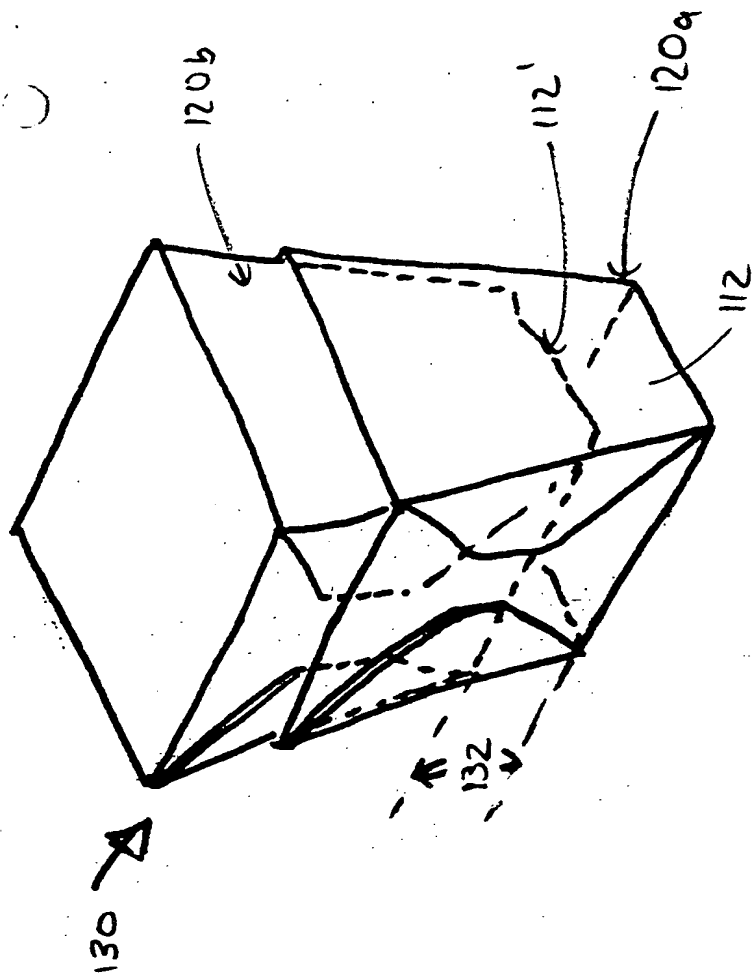


Fig 5

